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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
SCUDERI, PHILIP S	

ART UNIT	PAPER NUMBER
2153	

DATE MAILED: 03/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/040,440	ELLIS, IVAN KEITH	
	Examiner	Art Unit	
	Philip S. Scuderi	2153	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 January 2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☒ Claim(s) *4,5,9, 13, and 17* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 January 2002* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to because higher quality drawings currently exist. Examiner suggests that Applicant submit the same drawings submitted to the EPO in EPO application number 02250027.6.

2. Figure 2 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

3. Claims 4, 5, and 9 are objected to because of the following informalities: "synchronisation" on claim 4 line 1, claim 5 line 1, and claim 9 lines 1 and 2. Examiner suggests "synchronization". Appropriate correction is required.

4. Claim 9 is objected to because of the following informalities: "in which node receiving". Examiner suggests "in which a node receiving". Appropriate correction is required.

5. Claims 13 and 17 are objected to because of the following informalities: "synchronised" on claim 13 line 3 and claim 17 line 3. Examiner suggests "synchronized". Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 7, 13, and 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8. Claim 7 recites the limitation "the final two transmission periods" in line 1. There is insufficient antecedent basis for this limitation in the claim.

9. Claim 7 recites the limitation "these transmission periods" in line 4. There is insufficient antecedent basis for this limitation in the claim.

10. Claim 13 recites the limitation "its receipt" in line 9. There is insufficient antecedent basis for this limitation in the claim.

11. Claim 15 recites the limitation "its data" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. Claims 1-8, 10-11, and 13-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Green et al. (US 6,111,888; hereinafter "Green") in view of *Non-preemptive scheduling of messages on controller area network for real-time control applications* (Zuberi, K.M., Shin, K.G.; Real-Time Technology and Applications Symposium, 1995. Proceedings , 15-17 May 1995; Pages: 240 – 249; hereinafter "Zuberi").

14. With respect to claim 1, Green discloses a method of transmitting data within a distributed data processing system having a plurality of nodes (fig. 1 #101-103) interconnected via a data channel (fig. 1 #104), wherein the data processing system has a data transmission cycle subdivided into a plurality of transmission periods (see fig. 3), each period able to support the transmission of a plurality of data transmission events (fig. 3 #205, 206, 209, 210), and in which a priority is associated with each transmission event (col. 4 lines 24-26). Green does not disclose that the priority of real time transmission events are determined by the scheduled transmission time of the transmission events. Nonetheless, determining transmission priorities based upon scheduled transmission times in a controller area network environment was well known, as evidenced by Zuberi. In a similar art, Zuberi discloses a priority scheduling technique for use in a controller area network environment wherein transmission priorities are computed based upon scheduled transmission time (p. 243 section 4.1 "The most popular form of fixed-priority real-time scheduling is rate monotonic (RM). In this scheme, messages with a shorter period get higher priority than those with longer periods."). Given the further teachings of Green and the teachings of Zuberi it would have been obvious to one of ordinary skill in the art to determine the

priority of the of the real time transmission events by their respective scheduled transmission time. The motivation for doing so would have been because fixed-priority messaging is the natural choice for CAN bus interface chips, and rate monotonic scheduling is the most popular form of fixed-priority scheduling (Zuberi p. 243 section 4.1 "As already mentioned, fixed-priority scheduling is the natural choice for currently available CAN bus interface chips. The most popular form of fixed-priority real-time scheduling is rate monotonic (RM).").

15. With respect to claim 2, Green in view of Zuberi teaches the method applied to claim 1. Green further discloses that each node is allocated at least one transmission event in the transmission cycle (col. 4 lines 28-30).

16. With respect to claim 3, Green in view of Zuberi teaches the method applied to claim 1. It is inherent that a delayed transmission takes priority over all subsequently scheduled transmissions because priorities are assigned on the basis of scheduled transmission time.

17. With respect to claim 4, Green in view of Zuberi teaches the method applied to claim 1. Green further discloses that a synchronization signal is transmitted by one of the nodes and is defined as the most significant message within the transmission scheme (col. 7 lines 31-33, As shown in fig. 2, synchronization messages are transmitted at the beginning of the time divisions, therefore synchronization messages are the most significant messages.).

18. With respect to claim 5, Green in view of Zuberi teaches the method applied to claim 4. Green further discloses that the synchronization signal is transmitted first in any data transmission cycle (col. 7 lines 36-37).

19. With respect to claim 6, Green in view of Zuberi teaches the method applied to claim 1. Zuberi further discloses that in controller area networks nodes continuously monitor the data

channel for relevant transmissions (p. 241 section 2.2 "All nodes desirous of knowing the current temperature will set filters in their bus interface chips to match the above code. Then, whenever a message with this ID code is sent on the bus, the interface ships will automatically receive it and notify the processing element of the node."). Therefore, it is inherent that any node expecting to receive a specific item of data scheduled for transmission in a Nth transmission period checks for the data in a (N+2)th transmission period.

20. With respect to claim 7, Green in view of Zuberi teaches the method applied to claim 1. As discussed above, message priorities of the real time transmission events are determined by the scheduled transmission time of the transmission events. In controller area networks the priority is a fixed length field (Zuberi p. 243 fig. 2), and thus message priorities must be recycled. If a message priority overflows at a point when there are still messages yet to be transmitted then the deadline monotonic scheme would not work correctly. Therefore, it would be necessary to allocate sufficient spare transmission capacity to transmit any delayed transmissions at the end of the transmission cycle. For this reason, it would have been obvious to one of ordinary skill in the art to adapt the final two transmission periods of the transmission cycle to have fewer scheduled transmissions allocated to them.

21. With respect to claim 8, Green in view of Zuberi teaches the method applied to claim 1. Green further discloses that messages transmitted towards the end of the transmission cycle are of lower importance than messages scheduled for earlier transmission (col. 6 lines 27-36).

22. With respect to claim 10, Green in view of Zuberi teaches the method applied to claim 1. Green further discloses that each node is arranged to attempt to transmit data when the scheduled

time for the transmission of the data is reached (This is a standard feature of the CAN protocol as discussed in col. 6 lines 52-67).

23. With respect to claim 11, Green in view of Zuberi teaches the method applied to claim 1. Green further discloses that each node includes a communications interface with bus arbitration therein such that bus contentions are resolved (col. 6 lines 19-22).

24. With respect to claims 13 and 18, Green discloses a method of transmitting data within a distributed data processing system (fig. 1 #100), and a data transmission system (fig. 1 #100), having a plurality of nodes (fig. 1 #101-103) connected via a data pathway (fig. 1 #104), wherein the nodes are substantially synchronized to a reference (col. 7 lines 36-46) and at least one node attempts to transmit a predetermined item of data at a scheduled transmission time, as measured locally within a node, following the reference (fig. 3 #205, 206, 209, 210), and wherein each item of data is associated with a unique priority identifier (col. 6 lines 61-62, The priority identifiers must be unique for CAN priority arbitration to function properly. If the priorities were not unique then multiple nodes could attempt to transmit simultaneously.). Green does not disclose that the priority identifier indicates that the transmission priority of real time messages reduces as the scheduled transmission time of the message increases. Nonetheless, determining transmission priorities based upon scheduled transmission times in a controller area network environment was well known, as evidenced by Zuberi. In a similar art, Zuberi discloses a priority scheduling technique for use in a controller area network environment wherein transmission priorities are computed based upon scheduled transmission time (p. 243 section 4.1 "The most popular form of fixed-priority real-time scheduling is rate monotonic (RM). In this scheme, messages with a shorter period get higher priority than those with longer periods."). Given the

teachings of Zuberi it would have been obvious to one of ordinary skill in the art to determine the priority identifier of real time messages by a scheduled transmission time of the messages. Therefore, the priority identifier indicates that the transmission priority of a message reduces as the scheduled transmission time of the message increases. The motivation for doing so would have been because fixed-priority messaging is the natural choice for CAN bus interface chips, and rate monotonic scheduling is the most popular form of fixed-priority scheduling (Zuberi p. 243 section 4.1 "As already mentioned, fixed-priority scheduling is the natural choice for currently available CAN bus interface chips. The most popular form of fixed-priority real-time scheduling is rate monotonic (RM)."). Zuberi further discloses that controller area network nodes continuously monitor the data channel for relevant transmissions (p. 241 section 2.2 "All nodes desirous of knowing the current temperature will set filters in their bus interface chips to match the above code. Then, whenever a message with this ID code is sent on the bus, the interface ships will automatically receive it and notify the processing element of the node."). Therefore, it is inherent that any nodes expecting to receive a specific item of data scheduled for transmission in a Nth transmission period checks for the data in a (N+2)th transmission period.

25. With respect to claim 14, Green discloses a distributed data processing system (fig. 1 #100) having a plurality of nodes (fig. 1 #101-103) interconnected via a data channel (fig. 1 #104), wherein the data processing system has a data transmission cycle subdivided into a plurality of transmission periods (see fig. 3), each period able to support the transmission of a plurality of transmission events (fig. 3 #205, 206, 209, 210), and at least one node is allocated at least one transmission event in at least one of the transmission periods (col. 4 lines 28-30), and a priority is associated with each transmission event (col. 4 lines 24-26). Green does not disclose

that the priority of real time transmission events is determined by the scheduled transmission time of the transmission event. Nonetheless, determining transmission priorities based upon scheduled transmission times in a controller area network environment was well known, as evidenced by Zuberi. In a similar art, Zuberi discloses a priority scheduling technique for use in a controller area network environment wherein transmission priorities are computed based upon scheduled transmission time (p. 243 section 4.1 "The most popular form of fixed-priority real-time scheduling is rate monotonic (RM). In this scheme, messages with a shorter period get higher priority than those with longer periods."). Given the teachings of Zuberi it would have been obvious to one of ordinary skill in the art to determine the priority of real time transmission events by a scheduled transmission time of the transmission events. The motivation for doing so would have been because fixed-priority messaging is the natural choice for CAN bus interface chips, and rate monotonic scheduling is the most popular form of fixed-priority scheduling (Zuberi p. 243 section 4.1 "As already mentioned, fixed-priority scheduling is the natural choice for currently available CAN bus interface chips. The most popular form of fixed-priority real-time scheduling is rate monotonic (RM).").

26. With respect to claim 15, Green in view of Zuberi teaches the method applied to claim 14. Green further discloses that that each node transmits its data when the scheduled transmission time for the data, as determined by a timer within the node (The nodes must inherently comprise a timer in order to determine when to transmit data subsequent to the synchronization signal.), arrives (see fig. 3). Green further discloses that each node further includes a bus interface which resolves bus contentions based on message priority (col. 6 lines 27-36).

27. With respect to claim 16, Green in view of Zuberi teaches the method applied to claim 14. It is inherent that a delayed real time transmissions take priority over all subsequently scheduled real time transmissions within a transmission cycle because priorities are assigned on the basis of scheduled transmission time.

28. With respect to claim 17, Green in view of Zuberi teaches the method applied to claim 1. Green further discloses that one of the nodes is responsible for periodically generating a timing reference signal, to which other nodes are synchronized (col. 7 lines 36-46).

29. Claims 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Green in view of Zuberi, and further in view of Dickens (GB 2337347 A).

30. With respect to claim 9, Green in view of Zuberi teaches the method applied to claim 1. The instant invention teachings do not expressly disclose that a node receiving the synchronization signal adjusts on an internal clock to maintain synchronization. Nonetheless, receiving a synchronization signal and adjusting an internal clock to maintain synchronization in a controller area network environment was well known, as evidenced by Dickens. In a similar art, Dickens discloses receiving a synchronization signal and adjusting an internal clock to maintain synchronization (p. 2 lines 18-23) in a controller area network environment (see fig. 1). Given the teachings of Dickens it would have been obvious to one of ordinary skill in the art to adapt a node receiving the synchronization signal to adjust on an internal clock to maintain synchronization. The motivation for doing so would have been so that independent units could act in a defined way with respect to one another (Background of the Specification p. 1 lines 23-24).

31. Claims 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Green in view of Zuberi, and further in view of Duncan (US 5,884,420).

32. With respect to claim 12, Green in view of Zuberi teaches the method applied to claim 1. The instant teachings do disclose that none of the priorities associated with the messages differ by an exact power of 2, such that corruption of a single bit in the priority identifier results in an invalid identifier. Nonetheless, differing message encoding by more than an exact power of two was well known, as evidenced by Duncan. In a similar art, Duncan discloses a one-hot encoding scheme wherein each state in a binary constant is represented by a single bit (col. 1 lines 61-66), and thus each state differs by more than an exact power of two. Given the teachings of Duncan it would have been obvious to one of ordinary skill in the art to use a single bit to represent each priority, making no two priorities differ by an exact power of 2. Therefore the corruption of a single bit in the priority would result in an invalid identifier. The motivation for doing so would have been to increase the performance of the CAN interfaces (col. 2 lines 3-5).

Conclusion

33. The following art made of record and not relied upon is considered pertinent to applicant's disclosure:

- Nielsen (US 6,665,601);
- Barker (US 6,490,293);
- Haussler et al. (US 5,444,643);
- Botzenhardt et al. (US 5,111,460);
- Olson et al. (US 4,677,612);

- Ruszczyk (US 6,205,150);
- Beaulieu et al. (US 6,182,120);
- Kroon (US 6,816,458);
- Griessbach (US 6,587,474);
- Binns et al. (US 6,567,840);
- Sorber (US 6,240,067);
- Fischer et al. (US 2002/0027886);
- Ellis (EP 1223711 A2);
- Design and implementation of efficient message scheduling for controller area network, Zuberi, K.M., Shin, K.G.; Computers, IEEE Transactions on , Volume: 49 , Issue: 2 , Feb. 2000; Pages: 182 – 188; and
- Binary Encoding Versus One-Hot Encoding Normal Versus Buffered Outputs, URL: "http://web.archive.org/web/19991103220804/http://www.ee.calpoly.edu/courseware/ee319/binvsone.pdf".

34. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Philip S. Scuderi whose telephone number is (571) 272-5865. The examiner can normally be reached on Monday-Friday 8am-5pm.

35. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenton B. Burgess can be reached on (703) 305-4792. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

36. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PSS

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